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Balaganesh Natarajan
3rd Year Medical Student
St. George's University School of
Medicine, United States

Aashutosh Sah
M.B.B.S., Kathmandu Medical
College & Teaching Hospital,
Kathmandu, Nepal

Dr. Mariam Aisha Mangrio
M.B.B.S., Khairpur Medical
College, Sindh, Pakistan

Beeram Vivek
M.B.B.S., Andhra Medical
College, Andhra Pradesh, India

Hari Priya Sri Sai Mannam
M.B.B.S., Medical School,
Andhra Medical College, Andhra
Pradesh, India

Sweta Lohani
M.B.B.S., Kathmandu Medical
College & Teaching Hospital,
Kathmandu, Nepal

Murlidhar Pamarthi
M.B.B.S., Grant Govt. Medical
College & Sir J.J. Group of
Hospitals, Mumbai,
Maharashtra, India

Urva Dholu
Intern, M.B.B.S., GCS Medical
College, Hospital and Research
Centre, Ahmedabad, Gujarat,
India

Corresponding Author:

Urva Dholu
Intern, M.B.B.S., GCS Medical
College, Hospital and Research
Centre, Ahmedabad, Gujarat,
India

A prospective observational study on ischemic stroke and impact of thyroid profile

**Balaganesh Natarajan, Aashutosh Sah, Dr. Mariam Aisha Mangrio,
Beeram Vivek, Hari Priya Sri Sai Mannam, Sweta Lohani, Murlidhar
Pamarthi and Urva Dholu**

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Abstract

Background: The present study was conducted for assessing patients with ischemic stroke and impact of thyroid profile.

Materials and Methods: A total of 50 subjects with presence of acute ischemic stroke were enrolled in the present study. Complete demographic and clinical details of all the subjects was obtained. A thorough clinical examination of all the subjects was carried out. All the subjects were broadly divided into two study groups as follows: Group 1:25 subjects with normal consciousness and preserved effective verbal communication, and Group 2:25 subjects with poor verbal communication. Blood samples were obtained from all the patients and serum thyroid profile was evaluated.

Results: Among group 1 and group 2 subjects, majority of them had serum TSG and fT4 values within normal reference range. However, fT3 values were significantly altered among subjects of group 2.

Conclusion: Although most of the patients with acute ischemic stroke have normal thyroid function, a small proportion of patients requires further evaluation.

Keywords: Ischemic stroke, Thyroid

Introduction

Stroke, a cerebrovascular accident, is prevalent across patient populations and can be a significant cause of morbidity and mortality. Strokes can be categorized as ischemic, hemorrhagic, or subarachnoid. The etiology of ischemic stroke is due to either a thrombotic or embolic event that causes a decrease in blood flow to the brain. In a thrombotic event, the blood flow to the brain is obstructed within the blood vessel due to dysfunction within the vessel itself, usually secondary to atherosclerotic disease, arterial dissection, fibromuscular dysplasia, or inflammatory condition^[1, 2]. In an embolic event, debris from elsewhere in the body blocks blood flow through the affected vessel. The etiology of stroke affects both prognosis and outcomes^[3].

Thyroid hormone levels are often altered in patients with stroke; with approximately 28% of ischemic stroke patients having thyrotropin-releasing hormone (TSH) concentrations outside the reference range. A complex relationship has been described between thyroid function and recovery from ischemic stroke, probably because thyroid hormone has both neurotoxic and neuroprotective effects. Although critical to normal cell functioning, thyroid hormones can, in excess, overstimulate metabolism and exacerbate the sympathetic nervous system effect^[4, 5]. Hence; the present study was conducted for assessing patients with ischemic stroke and impact of thyroid profile.

Materials and Methods

The present study was conducted for assessing patients with ischemic stroke and impact of thyroid profile. A total of 50 subjects with presence of acute ischemic stroke were enrolled in the present study. Complete demographic and clinical details of all the subjects was obtained. A thorough clinical examination of all the subjects was carried out. Analysis of the medical documentation in terms of laboratory tests including thyroid hormones as well as coexisting diseases. All the subjects were broadly divided into two study groups as follows: Group 1:25 subjects with normal consciousness and preserved effective verbal communication, and Group 2:25 subjects with poor verbal communication. Blood samples were obtained from all the patients and serum thyroid profile was evaluated.

All the results were recorded and analyzed using SPSS software.

Results

Mean age of the subjects of group 1 and group 2 was 62.5 years and 59.4 years respectively. Majority proportion of subjects of both the study groups were males. Among group 1 and group 2 subjects, majority of them had serum TSG and fT4 values within normal reference range. However,

fT3 values were significantly altered among subjects of group 2.

Table 1: Demographic data

Variable	Group 1	Group 2
Mean age (years)	62.5	59.4
Gender	Males (n)	15
	Females (n)	10

Table 2: Comparison of thyroid profile

Variable	Group 1	Group 2	p-value
Serum TSH	In reference range of 0.28 mIU/L to 4.2 mIU/L	22	0.85
	In range of more than 4.2 mIU/L	3	
	In range of less than 0.28 mIU/L	0	
fT3	In reference range of 3.1 to 6.8 pmol/L	25	0.00*
	In range of more than 6.8 pmol/L	0	
	In range of less than 3.1 pmol/L	0	
fT4	In reference range of 12 pmol/L to 22 pmol/L	23	0.48
	In range of more than 22 pmol/L	1	
	In range of less than 12 pmol/L	1	

*: Significant

Discussion

Stroke is the second most common cause of mortality and third most common cause of disability worldwide. Globally, 68% of all strokes are ischemic and 32% are hemorrhagic. Numbers from the USA differ a little with 87% of all strokes being ischemic, 10% hemorrhagic and about 3% being subarachnoid hemorrhage. Data regarding prevalence of stroke in India is lacking however, it can be extrapolated from the data available from the West. In a study done by Banerjee *et al.* in 2001 crude prevalence rate of stroke in India was 147/100,000 and the annual incidence rate was 36/100,000 [6-8]. It is of great importance to research the prognosis of ischemic stroke for use in the guidance of medical and rehabilitation therapy, and also to improve the life quality of stroke survivors. Several factors, including stroke severity, age, sex, vascular risk factors and comorbidities, have been found to be associated with the outcome of ischemic stroke. However, recent prognostic studies of other factors, like endocrine hormones and inflammatory cytokines, have not shown a consistent result [9, 10]. Hence; the present study was conducted for assessing patients with ischemic stroke and impact of thyroid profile. Mean age of the subjects of group 1 and group 2 was 62.5 years and 59.4 years respectively. Majority proportion of subjects of both the study groups were males. Among group 1 and group 2 subjects, majority of them had serum TSG and fT4 values within normal reference range. However, fT3 values were significantly altered among subjects of group 2. Our results were in concordance with the results obtained by previous authors who also reported similar findings. In a study conducted by Dhital R *et al.*, authors identified the association between baseline thyroid function profile and outcome after acute ischemic stroke. They concluded that elevated initial TSH (clinical or subclinical hypothyroidism) may correspond to better functional outcomes, whereas low initial T3/fT3 might correlate with worse outcomes in acute ischemic stroke among clinically euthyroid patients [11].

Two studies reported evident reductions of tissue infarction and edema in a transient middle cerebral artery occlusion (t-MCAO) model of male mice injected with T3, and attributed this anti-edema effect to suppression of the expression of aquaporin-4 (AQP4) water channels by T3. Studies also found that T3 and T4 could inhibit apoptosis, resist excitability-related amino acid toxicity suppress

inflammatory reactions and increase ATP production by stimulation of astrocyte fatty acid oxidation in animal models of brain ischemia [12-15]. In another study conducted by Lena M. O'Keefe *et al.* authors investigated the role of TSH on stroke outcomes, concomitantly with T3 and T4. Bblood was collected from patients with radiologically confirmed acute ischemic stroke at 24±6 hours post-symptom onset and serum levels of TSH, free T3, and free T4 were measured. Stroke outcomes were measured at discharge, 3 and 12 months using the modified Rankin scale and modified Barthel Index as markers of disability. Their study found that lower levels of free T3 were associated with poorer outcomes at hospital discharge, and at 3 and 12 months post stroke, however, these associations diminished after correction for other known predictors of stroke outcome [16].

Conclusion

From the above results, the authors conclude that although most of the patients with acute ischemic stroke have normal thyroid function, a small proportion of patients requires further evaluation.

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